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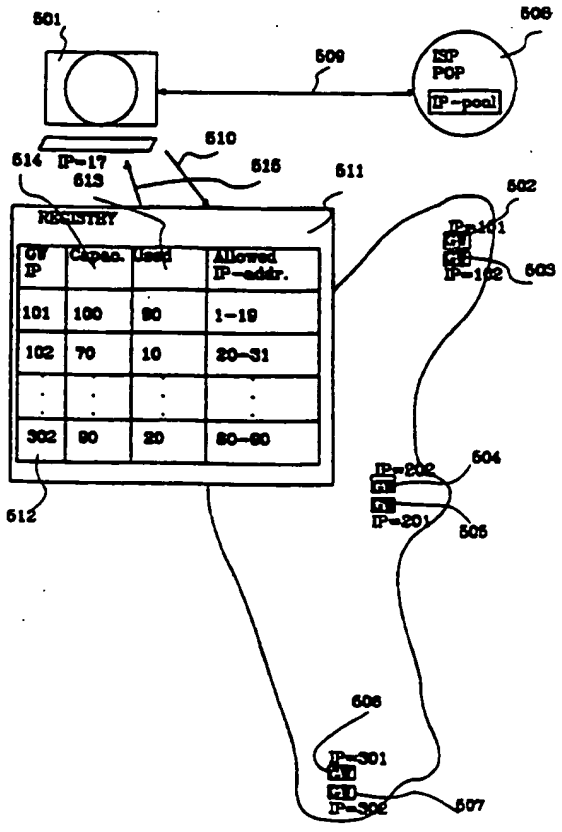
(54) Title: METHOD AND APPARATUS FOR SELECTING ONE VOICE GATEWAY FROM MULTITUDE OF VOICE GATEWAYS, WHICH SHALL SERVE A REMOTE APPLICATION

(57) Abstract

The present invention discloses a method and apparatus for solving the problem with how to select one voice gateway from a multitude of voice gateways which shall serve a remote application. The problem is solved by selecting a VGWM in dependence of the characteristics of a multitude of VGWMs and the characteristics of the user.



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LR	Liberia
LS	Lesotho
LT	Lithuania
LU	Luxembourg
LV	Latvia
MC	Monaco
MD	Republic of Moldova
MG	Madagascar
MK	The former Yugoslav Republic of Macedonia
ML	Mali
MN	Mongolia
MR	Mauritania
MW	Malawi
MX	Mexico
NE	Niger
NL	Netherlands
NO	Norway
NZ	New Zealand
PL	Poland
PT	Portugal
RO	Romania
RU	Russian Federation
SD	Sudan
SE	Sweden
SG	Singapore
SI	Slovenia
SK	Slovakia
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METHOD AND APPARATUS FOR SELECTING ONE VOICE GATEWAY FROM MULTITUDE OF VOICE GATEWAYS, WHICH SHALL SERVE A REMOTE APPLICATION

TECHNICAL FIELD OF THE INVENTION

The present invention relates to Internet and telecommunication in general and to optimal selection of voice gateways in particular.

DESCRIPTION OF RELATED ART

A telephone user, hereafter called a subscriber, may, by using a modem, connect to an ISP (Internet Service Provider) and thus get access to the Internet through his regular voice telephone. The drawback is that while the subscriber is using his internet account (surfing) his phone is busy and therefore will anyone dialling to the subscriber get a busy-tone. This can be solved as described in the Swedish application SE-9602212-4 by forwarding calls to the subscriber to a voice gateway. The voice gateway handles the translation between voice and internet and the subscriber will receive a message indicating a waiting voice call and can connect to the calling party using state-of-the-art voice-over-internet technology. This way the subscriber may simultaneously be connected to internet and using his voice phone.

The subscriber may also place an outgoing call through the voice gateway in a similar manner. For a deeper description of the above mentioned ideas please refer to SE-9602212-4.

To be able to maintain a reasonable good speech quality when transferring voice over internet it is necessary to minimise the number of router hop. This problem is not solved in the related art.

SUMMARY OF THE INVENTION

The present invention disclose a method and apparatus for solving the problem with how to select one voice gateway from a multitude of voice gateways which shall serve a remote application.

The purpose of the present invention is to be able to select an optimal voice gateway to use as a resource for taking incoming and placing outgoing voice calls during an internet session.

The problem, described above, regarding how to select an optimal voice gateway is solved by selecting a VGWM from a table of VGWM in dependence of the characteristics of the VGWMs and the characteristics of the user.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows in overview a logical network model.
Figure 2 shows in more detail the phone-doubler and its interfaces.
Figure 3 displays a physical network model.
Figure 4 shows an flowchart of a preferred embodiment according to the invention.
Figure 5 shows an overview of an preferred embodiment according to the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

I the following description, for purposes of explanation and not limitation, specific details are set forth, in order to provide a thorough understanding of the present invention. However, it will be apparent to one skilled in the art that the present invention may be practised in other embodiments that depart from these specific details. In other instances, detailed descriptions of well known methods, devices, and circuits are omitted so as not to obscure the description of the present invention with unnecessary detail.

In figure 1 is a general overview of the surroundings of the network and how the phone-doubler interfaces with its neighbours. With 101 is a user who is connected to the phone-doubler 102 denoted. The phone-doubler 102 is also connected to the ISP (Internet Service Provider) 103, to the ISDN (Integrated Services Digital Network) 104 and to ISP-adaptations 105. Such adaptations could for instance be a PCAU (PSTN Control Adaptation Unit) 106. The PCAU 106 is a unit that mediates between phone-doubler 102 and the network operators PSTN network, for the purpose of activation and deactivation of call diversions. Call diversion is an integral part of the workings of the phone-doubler. Another adaptation unit can be a CCAU (Customer Care Adaptation Unit) 107, which is a unit that mediates between phone-doubler 102 and the customer care system of the ISP. The last adaptation unit shown in figure 1 is the BCAU (Billing Centre Adaptation Unit) 108, which is a unit that mediates between phone-doubler 102 and the billing centre of the ISP.

In figure 2 a more detailed description of the inner working of the phone-doubler and its interfaces is shown. The user 201 is still present and is utilising the phone-doubler 202 through an UI (User Interface) 203. The UI could for instance be a Microsoft Windows application giving the user a windows user interface for handling the phone-doubler services. The user is using a client software 204 which could be the just mentioned windows application handling the communication with the gateway 206 over a CLGI (Client Gateway Interface) 205. The gateway 206 is located on the ISP 209 premises. The gateway 206 can be located at different geographical locations. The gateway 206 comprises a gateway registry 207 which is common to all subscribers to the phone-doubler services, and at least one VGWM (Voice GateWay Module) 208. The VGWM 208 processes the call and speech transmissions and can handle several calls simultaneous.

The ISP has for operation and maintenance a OMI (Operation and Maintenance Interface) 210 to the phone-doubler 202. An PRI (Primary Rate Interface) 211 connects the phone-doubler 202 with the ISDN 212.

For communication between the phone-doubler 202 and the ISP-adaptations 213 a number of different interfaces are used. PCAI (PSTN Control Adaptation Interface) 214 for communication with PCAU 215, CCAI (Customer Care Adaptation Interface) 216 for communication with CCAU 217 and BCAI (Billing Centre Adaptation Interface) for communication with BCAU 218.

The client 204 is running on a PC (Personal Computer) 301 in figure 3, located at the users premises 302 and connected to the ISP's POP (Point Of Presence) 303, at the ISP's premises 304 via a modem 305 and PSTN 306. The PC 301 is given an IP-address 307 by the ISP. This is normally done dynamically when connecting to the POP 303. The users normal telephone line 308 is used for connecting between the modem 305 and the PSTN 306.

One or several VGWM 309 is connected to the ISP's IP network 310, typically on the same switched Ethernet as the POP but not necessarily. Each VGWM 309 has its own IP-address, and the registry 311 may have an IP-address of its own, or share the IP-address of one of the VGWM's 309.

Each VGWM 309 is connected to ISDN 312 via PRI.

One registry node 311 can handle several VGWM 309. The registry node 311 can physically be remotely placed. An ISP can have one central registry node 311 and several distributed VGWM 309.

The client 204 in figure 2 stores a number of different data items such as:

- Country code

- Area code (including trunk prefix)
- Telephone number (local number)
- Service preferences
- client IP address (volatile)
- Hostname of registry
- VGWM IP address (volatile)
- ISDN number to VGWM cluster (this may be a group number)
- Reject incoming calls (volatile, settable from the GUI)

The combination of country code, area code, and local number identifies each subscriber uniquely.

The VGWM IP address attribute also represents the state of the client: A null address indicates that the client is signed-off from the phone-doubler service, any other address indicates that the client is signed-on.

The registry 311 holds a subscriber record for each client, where each record comprises the following attributes:

- telephone number (key, persistent, made up from country code, area code, and local number)
- password (persistent, stored with a one-way function encryption)
- client IP address (secondary key, volatile)
- user id (persistent)
- service preferences (persistent)
- number of sign-on (persistent)
- number of incoming calls (persistent)
- number of outgoing calls (persistent)
- first sign-on (persistent)
- last sign-on (persistent)

The client IP address attribute also represents the state of the subscriber record, a null IP address states that the client 204 is signed-off, any other address states that the client 204 is signed-on.

When a user 201 is connected to the Internet, the IP address of the client 307 is entered into the subscriber record. Since both the telephone number and this IP address are keys, an PSTN-to-IP association between the telephone number and IP address is maintained in the subscriber record.

Whenever an event occurs in the phone-doubler service relating to the registry, a record is created in the registry 311 and stored in the registry log. The registry log contains records of events, relating to the session that takes place between a sign-on and a sign-off. A registry log record is created when a subscriber record changes state to signed-off, or when a subscriber record is deleted. The registry log record comprises the following attributes:

- Record id (sequence number)
- Termination date (timestamp of session termination)
- Client IP address
- user id
- User's telephone number
- Sign-on date
- Duration
- Number of incoming calls
- Number of outgoing calls
- Termination code (indicating which normal event or exception that terminated the session)

The phone-doubler can have one or several VGWM's. Each of these VGWM's holds a record of each call or call attempt made through

that particular VGWM. The call record may comprise the following attributes:

- Record id (per-VGWM sequence number)
- Date and time (timestamp of the completed log record)
- Client IP address and port
- User's telephone number
- Direction (incoming or outgoing)
- VGWM IP address and port
- VGWM ISDN number
- B-number (same as user's telephone number for incoming call)
- Call set-up date and time
- Duration
- Sent packages
- Received packages
- Answer state. Answered, rejected or not answered
- Termination reason. User, client, ISDN or VGWM.

For the phone-doubler service to be able to handle a large number of users 201, or to be able to handle users 201 geographically spread out, several VGWM's 208 are needed. These VGWM's 208 can be geographically far from each other so that a user 201 located in one part of the country can use the VGWM 208 closest to him to be able to minimise the path between the user 201 and the VGWM 208 on the internet. This is important to minimise the number of router hop since these introduces packet delays which can be of some problem to a real-time service like voice when transported over a packet-switched network.

When the user 201 signs-on to the phone-doubler service the registry 207 selects a suitable VGWM 208 to serve the user 201. This selection can be performed in dependence of the load of the

VGWM 208, the geographically location of the VGWM 208 and the user 201, the signalling load in the network etc.

In this preferred embodiment, while referring to figure 4 and figure 2, the user 201 starts an internet session 401. The user 201 then signs-on to the phone-doubler service 402. In the sign-on procedure the client 204 will send its IP-adress to the registry 207, 403. The registry 207 receives and stores the client 204 IP-adress 404. The registry 207 compares the received IP-adress with a table, stored at the registry 207, of IP-addresses and VGWM's 208. The comparison results in a list of approved VGWM's 208. From the list, the registry 207 selects the VGWM 208 with the most available capacity by comparing the number of currently signed-on users 201 with the available capacity 405. The registry 207 also checks whether the maximum number of allowed users 201 will not be exceeded and that the selected VGWM 208 is actually alive, and not disabled. This can be done by sending a short message to the VGWM 208 and expect an answer. The registry 207 then sends the IP-adress of the selected VGWM 208 to the client 204, 406 and the client 204 receives and stores the IP-adress of the VGWM 208 for future use 407.

In another preferred embodiment the registry 207 do not send the IP-adress of the selected VGWM 208 to the client 204 but stores internally the selected VGWM 208. When the user 201 wants to place an outgoing call, the client 204 connects to the registry 207. The registry 207 performs an authentication process with the client 204 and, if the authorisation goes well, acts as a mediator between the client 204 and the VGWM 208. This is to increase the security in the phone-doubler service.

In figure 5 a preferred embodiment is further explained. A user 501 is located in Kiruna in northern Sweden. In Kiruna is two VGWM located 502, and 503 further is VGWM's located in Stockholm

504, and 505 and in Malmoe 506, and 507. The user 501 connects to internet 509 through the ISP POP 508 and is assigned IP-adress 17. For purpose of simplicity two or three digit IP-addresses are used and not the real format. The format of the IP-adress is of no importance for this invention. The user 501 then assigns to the phone-doubler service 510. The registry 511 checks the stored table 512 and finds that two VGWM's is suitable for the user 501, namely VGWM 502 and 503 with IP-addresses 101 and 102 located in Kiruna. The registry 511 then checks which VGWM has the most available capacity by comparing the number of currently signed-on users with the number of maximum signed-on users 514. The registry concludes that VGWM 502 with IP-adress 102 has the most available capacity and sends 515 the IP-adress of the VGWM 503 to the user 501.

The invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

CLAIMS

1. A method for selecting a VGWM, used for placing an outgoing call from a user during an ongoing internet session, CHARACTERISED in that a registry application selects one VGWM from a table of VGWMs in dependence of the characteristics of said selected VGWM and the characteristics of said user.

2. A method according to claim 1, CHARACTERISED in that said table comprises, for each VGWM, a range of allowed user IP-addresses and that said registry application selects a VGWM further in dependence of if the users IP-adress is allowed.

3. A method according to claim 1, CHARACTERISED in that said table comprises, for each VGWM, a range of allowed user-ids and that said registry application selects a VGWM further in dependence of if the users user-id is allowed.

4. A method according to claim 2 or 3, CHARACTERISED in that the characteristics of said selected VGWM comprises the geographical position, the position in the network, the load of the selected VGWM, the load of other VGWMs and that said characteristics of the user comprises the geographical position, the network position, the IP-adress, the user-id, the priority of the user.

5. A method according to claim 1, CHARACTERISED in that said user contacts said registry application, that said registry application in dependence of said clients IP-adress, occupancy levels of said VGWMs and availability of said VGWMs selects a first VGWM, that said registry application transmits the IP-adress of said first VGWM to said user and that said user uses said transmitted IP-adress for communication with said first VGWM.

6. A method according to claim 1, CHARACTERISED in that said user contacts said registry application, that said registry application in dependence of said clients IP-adress, occupancy levels of said VGWM and availability of said VGWM selects a first VGWM, that said registry application stores the identity of said selected VGWM and that said registry application instructs said selected VGWM to place an outgoing call for said user.

7. An apparatus for selecting a VGWM, used for placing an outgoing call from a user during an ongoing internet session, CHARACTERISED in a registry application arranged to select one VGWM from a table of VGWMs in dependence of the characteristics of said selected VGWM and the characteristics of said user.

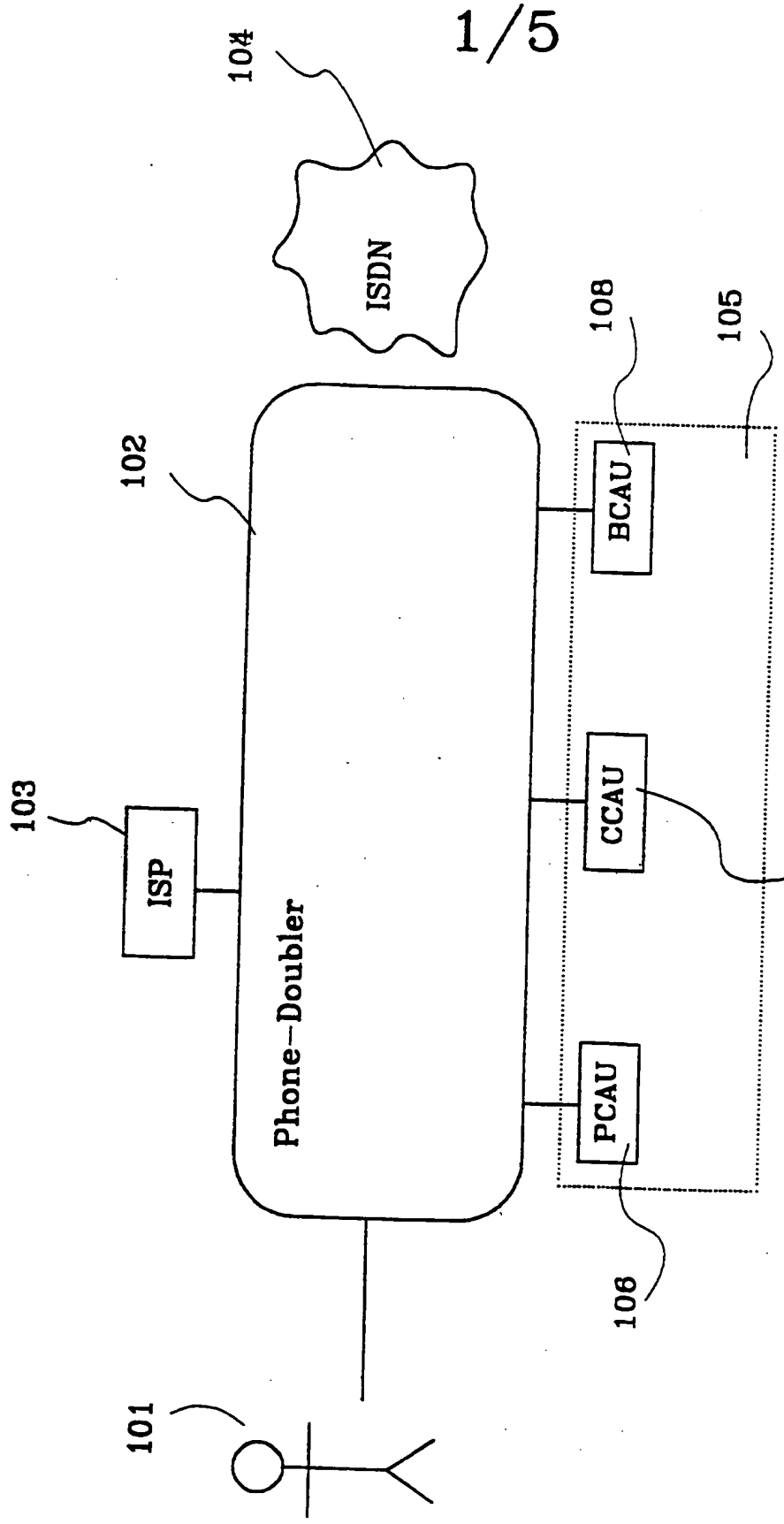
8. An apparatus according to claim 7, CHARACTERISED in that said table comprises, for each VGWM, a range of allowed user IP-addresses and that said registry application is arranged to select a VGWM further in dependence of if the users IP-adress is allowed.

9. An apparatus according to claim 7, CHARACTERISED in that said table comprises, for each VGWM, a range of allowed user-ids and that said registry application is arranged to select a VGWM further in dependence of if the users user-id is allowed.

10. An apparatus according to claim 8 or 9, CHARACTERISED in that the characteristics of said selected VGWM comprises the geographical position, the position in the network, the load of the selected VGWM, the load of other VGWMs and that said characteristics of the user comprises the geographical position, the network position, the IP-adress, the user-id, the priority of the user.

11. An apparatus according to claim 7, CHARACTERISED in a client application arranged to contact said registry application, that said registry application is arranged to, in dependence of said clients IP-adress, occupancy levels of said VGWMs and availability of said VGWMs select a first VGWM, that said registry application is arranged to transmit the IP-adress of said first VGWM to said client application and that said client application is arranged to use said transmitted IP-adress for communication with said first VGWM.

12. An apparatus according to claim 1, CHARACTERISED in a client application arranged to contact said registry application, that said registry application is arranged to, in dependence of said clients IP-adress, occupancy levels of said VGWMs and availability of said VGWMs select a first VGWM, that said registry application stores the identity of said selected VGWM and that said registry application is arranged to instruct said selected VGWM to place an outgoing call for said user.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ISDN
108
105
102
BCAU
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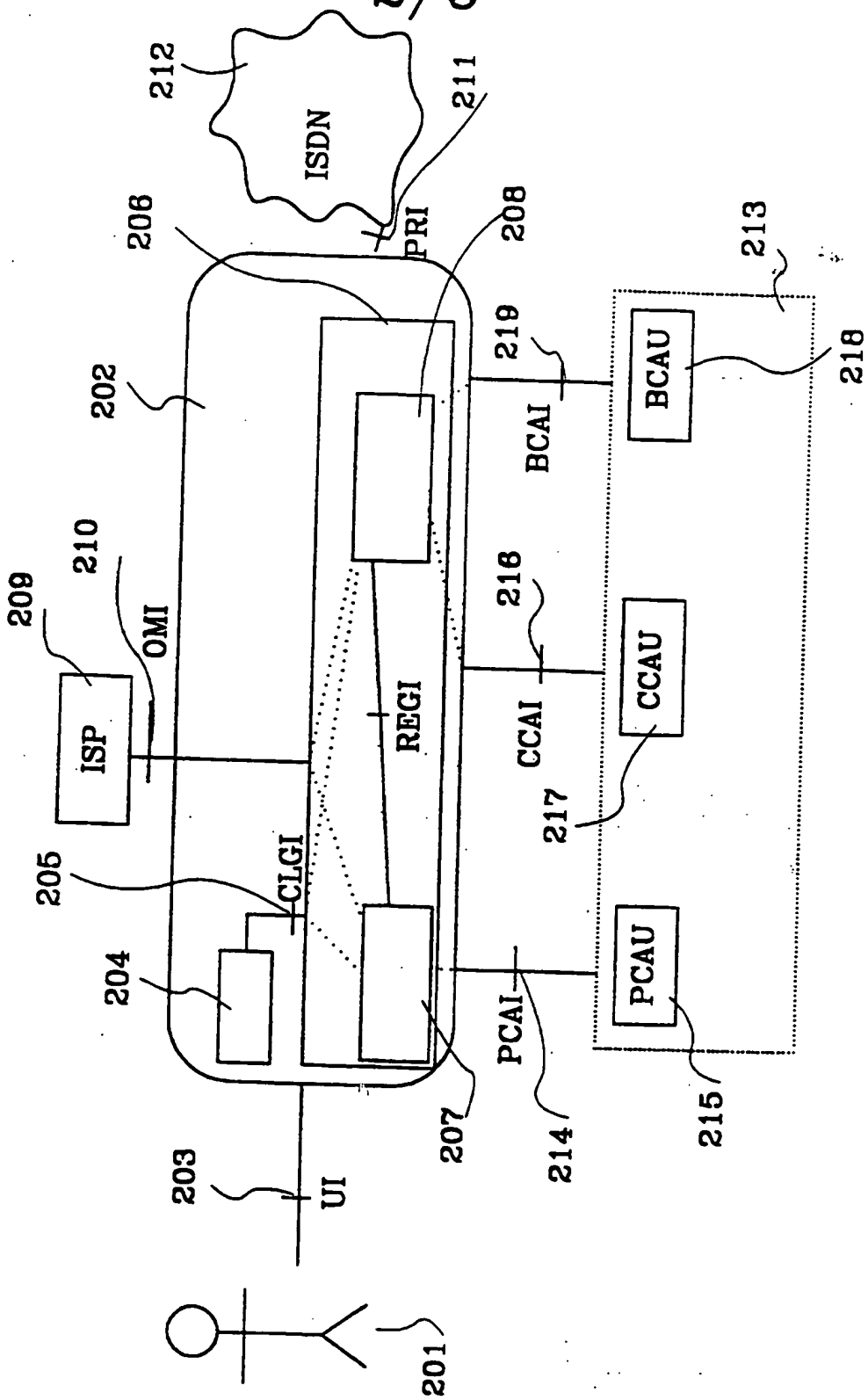
ISP
Phone–Doubler
107
PCAU
106
101

Fig 1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CCAI
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214
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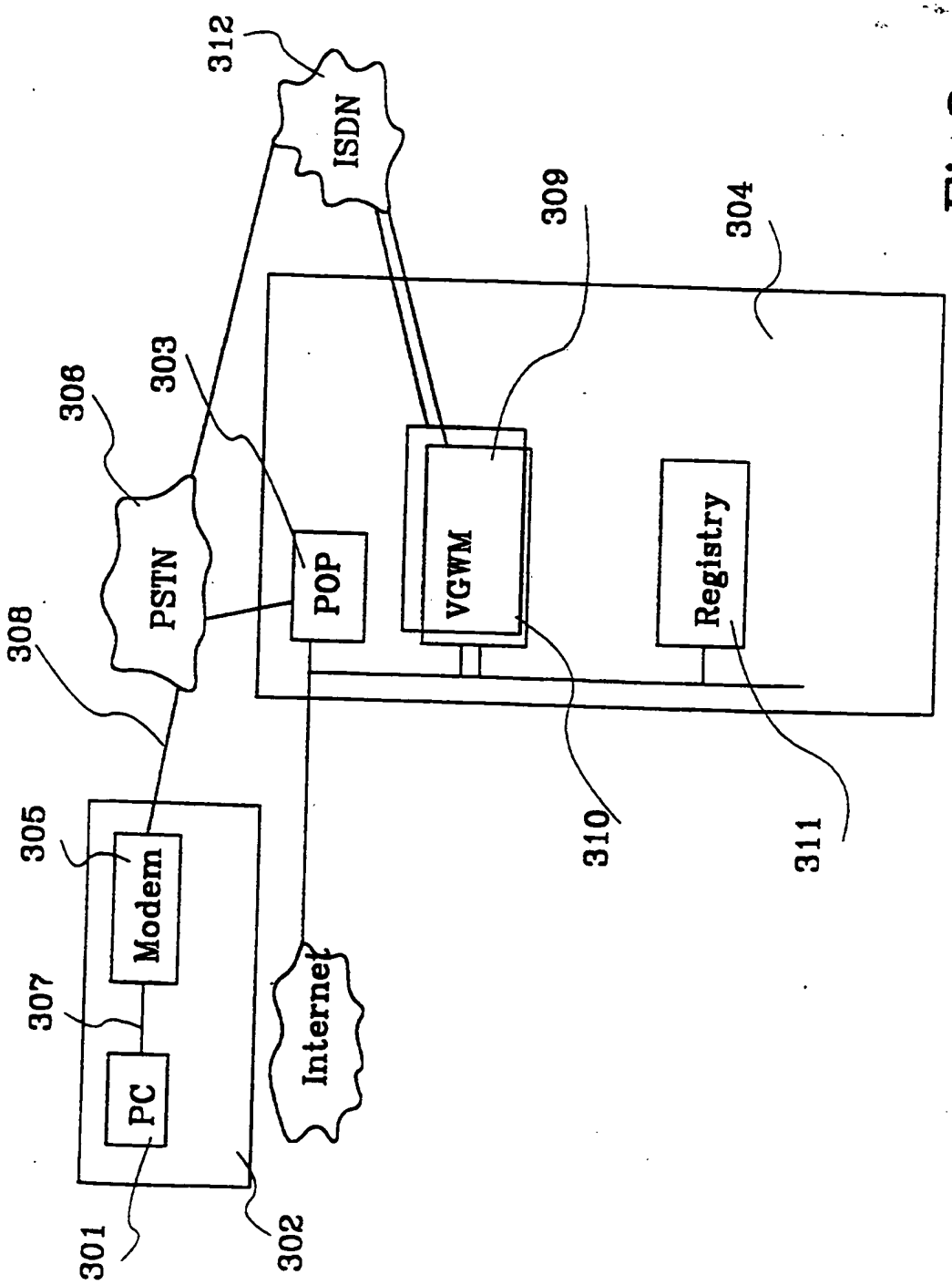
UI
201

Fig 2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305
Modem
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PC
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311
301
302

Fig3

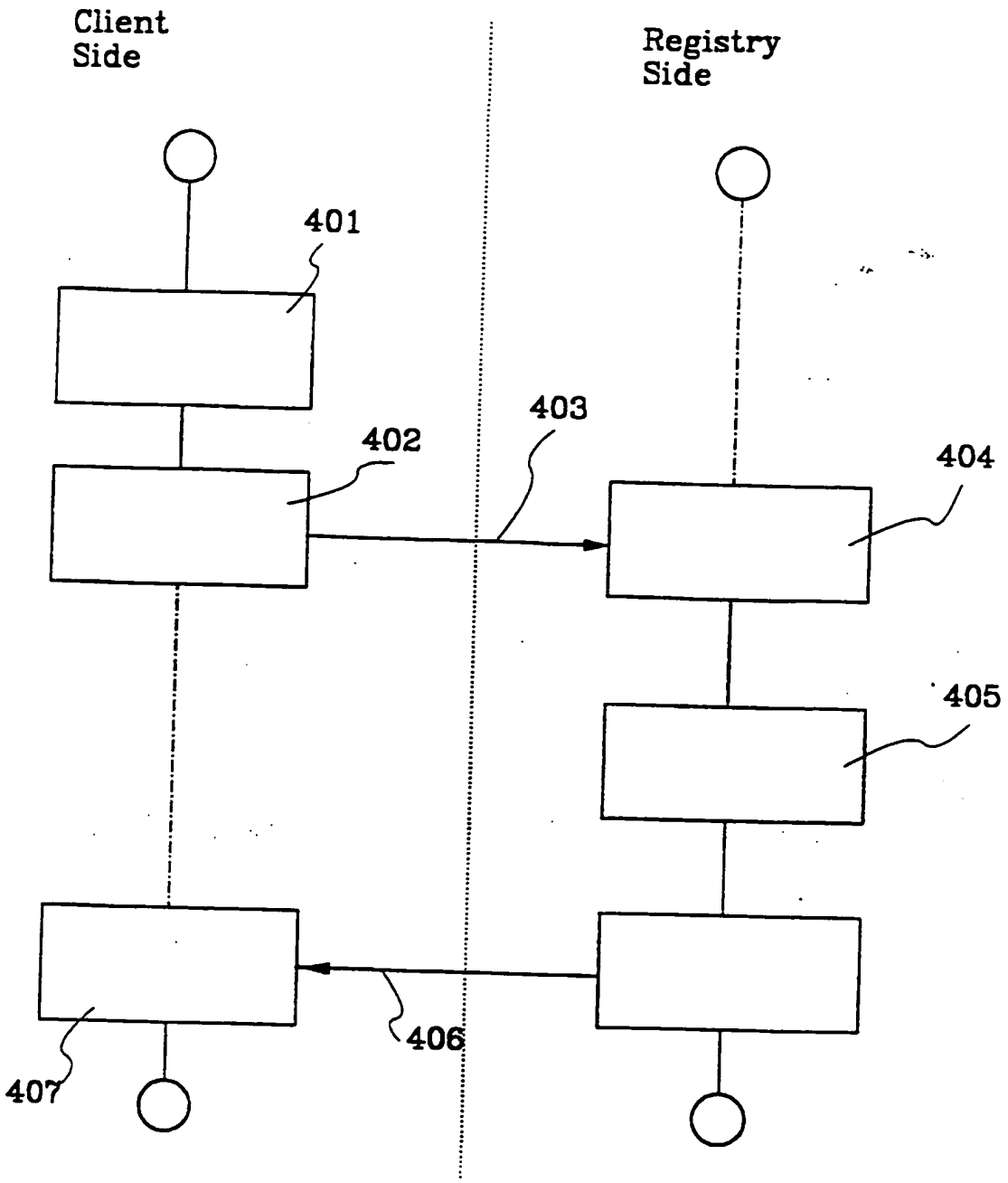
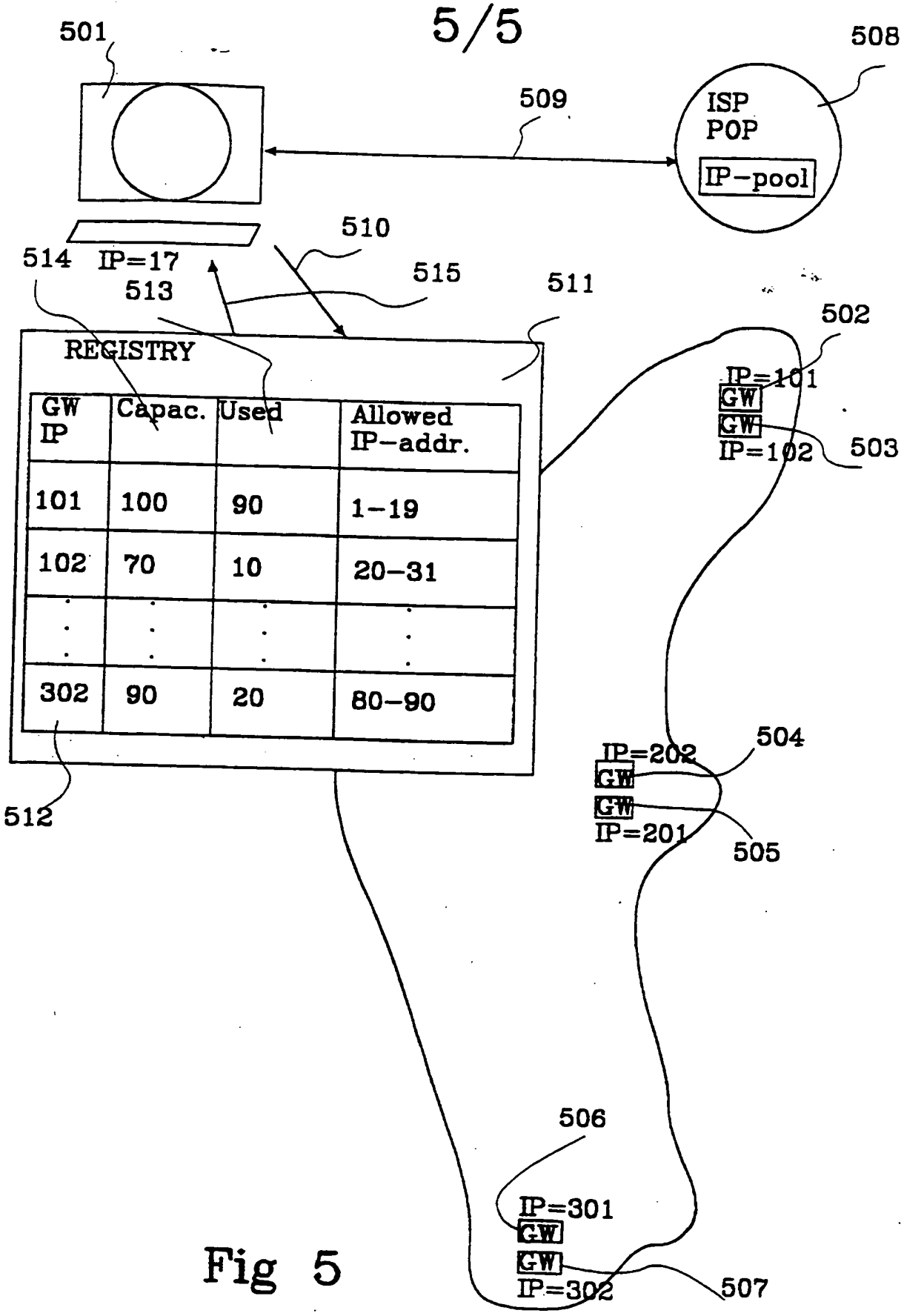


Fig. 4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REGISTRY
GW IP
Capac.
Used
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IP=101
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505
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IP=301
GW
GW
IP=302
507

Fig 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 97/01796

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04Q 3/00
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0771095 A2 (AT&T CORP), 2 May 1997 (02.05.97), abstract ---	1-12
A	EP 0169726 A2 (RACAL RESEARCH LIMITED), 29 January 1986 (29.01.86), page 4, line 17 - page 5, line 5 ---	1-12

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INTERNATIONAL SEARCH REPORT
Information on patent family members

02/03/98

International application No.
PCT/SE 97/01796

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0771095 A2	02/05/97	CA 2184209 A	25/04/97
		JP 9214564 A	15/08/97
EP 0169726 A2	29/01/86	SE 0169726 T3	
		GB 2162404 A,B	29/01/86
		US 4748655 A	31/05/88